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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/034,732	12/28/2001	Sudhakar Bobba	03226.156001;P6864	1384

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ROSENTHAL & OSHA L.L.P. / SUN
1221 MCKINNEY, SUITE 2800
HOUSTON, TX 77010

EXAMINER

CHU, CHRIS C

ART UNIT PAPER NUMBER

2815

DATE MAILED: 10/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/034,732

Applicant(s)

BOBBA ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 - 28 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: In Fig. 4c, reference elements 53a ~ 53d are not disclosed in the specification of this application. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. Applicant is required to submit a proposed drawing correction in reply to this Office action. However, formal correction of the noted defect may be deferred until after the examiner has considered the proposed drawing correction. Failure to timely submit the proposed drawing correction will result in the abandonment of the application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 ~ 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujiki et al.

Regarding claim 1, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 a bump and vias structure, comprising:

- a metal layer (3);
- a bump (10 on D) mounted on the metal layer;
- a first plurality of vias (5, at the top) disposed on a first outer region of the metal layer, wherein the first outer region has a first density of vias; and
- a second plurality of vias (5, at the bottom) disposed on a second outer region of the metal layer, wherein the second outer region has a second density of vias,
- wherein the first density and second density are greater than a third density of vias disposed on a central region (at the middle area where the element 5 are not exist) between the first and second outer regions.

Regarding claims 2, 9 and 16, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 the first density being substantially equal to the second density.

Regarding claims 3, 10 and 17, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 a first current path from the first outer region to the bump being substantially equal to a second current path from the second outer region to the bump.

Regarding claims 4, 11 and 18, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 there being no vias in the central region.

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Regarding claims 5, 12 and 19, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 current injection from the first outer region to the bump being greater than current injection from the central region to the bump.

Regarding claims 6, 13 and 20, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 current injection from the second outer region to the bump being greater than current injection from the central region to the bump.

Regarding claims 7, 14 and 21, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 the central region being positioned further from the bump than the first and second outer regions.

Regarding claim 8, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 an integrated circuit, comprising:

- a metal layer (3);
- a bump (10 on D) mounted on the metal layer;
- a first plurality of vias (5, at the top) disposed on a first outer region of the metal layer, wherein the first outer region has a first density of vias; and
- a second plurality of vias (5, at the bottom) disposed on a second outer region of the metal layer, wherein the second outer region has a second density of vias,
- wherein the first density and second density are greater than a third density of vias disposed on a central region (at the middle area where the element 5 are not exist) between the first and second outer regions.

Regarding claim 15, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 a method for reducing current crowding in a bump and vias structure, comprising:

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- distributing current from a first outer region (at the top area where the elements 5 are located) of a metal layer (3) to a bump (10 on D) mounted on the metal layer, wherein the first outer region has a first density of vias (5, at the top); and
- distributing current from a second outer region (at the bottom area where the elements 5 are located) of the metal layer to the bump, wherein the second outer region has a second density of vias (5, at the bottom),
- wherein the first density and second density are greater than a third density of vias disposed in a central region (at the middle area where the element 5 are not exist) between the first and second outer regions.

Regarding claim 22, Fujiki et al. discloses in Fig. 3, Fig. 7 and column 10, lines 38 ~ 67 a method for reducing current crowding on a bump, comprising:

- defining a first region (at the top area where the elements 5 are located) and a second region (at the bottom area where the elements 5 are located) on a metal layer (3) to which the bump (10) is mounted;
- determining a first current path length from the first region to the bump;
- determining a second current path length from the second region to the bump;
- disposing a first plurality of vias (5, at the top) in the first region at a first density depending on the first current path length; and
- selectively disposing a second plurality of vias (5, at the bottom) in the second region at a second density depending on the second current path length.

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5. Claims 22 ~ 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Rostoker et al.

Regarding claim 22, Rostoker et al. discloses in Fig. 7a, Fig. 10a and column 17, lines 4 ~ 22 a method for reducing current crowding on a bump, comprising:

- defining a first region (at the top-right corner area where the elements 1012 are located) and a second region (at the middle area where the elements 1012 are located) on a metal layer (1030) to which the bump (706a') is mounted;
- determining a first current path length from the first region to the bump;
- determining a second current path length from the second region to the bump;
- disposing a first plurality of vias (1012, at the top-right corner area) in the first region at a first density depending on the first current path length; and
- selectively disposing a second plurality of vias (1012, at the middle area) in the second region at a second density depending on the second current path length.

Regarding claim 23, Rostoker et al. discloses in Fig. 7a, Fig. 10a and column 17, lines 4 ~ 22 the first current path length being longer than the second current path length, and wherein the first density is greater than the second density.

Regarding claim 24, Rostoker et al. discloses in Fig. 7a, Fig. 10a and column 17, lines 4 ~ 22 the second plurality of vias being disposed further from the bump than the first plurality of vias.

Regarding claim 25, Rostoker et al. discloses in Fig 7a, Fig. 10a and column 17, lines 4 ~ 22 further comprising:

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- defining a third region (at the top-left corner area where the elements 1012 are located) on the metal layer;
- determining a third current path length from the third region to the bump; and
- disposing a third plurality of vias (1012, at the top-left corner area) in the third region at a third density depending on the third current path length.

Regarding claim 26, Rostoker et al. discloses in Fig. 7a, Fig. 10a and column 17, lines 4 ~ 22 the third current path length being longer than the second current path length, and wherein the third density is greater than the second density.

Regarding claim 27, Rostoker et al. discloses in Fig. 7a, Fig. 10a and column 17, lines 4 ~ 22 the second plurality of vias being disposed further from the bump than the third plurality of vias.

Regarding claim 28, Rostoker et al. discloses in Fig. 10a and column 17, lines 4 ~ 22 the first density being substantially equal to the third density.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Trivedi et al., Lee et al., Heim and Nozaki disclose a pad and vias.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

c.c.
October 6, 2003



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800